WHAT IS CLAIMED IS:

1. A mass analysis apparatus comprising a first ion source which ionizes a sample and produces sample ions, a second ion source which produces ions having a polarity opposite to the polarity of the sample ions, and a mass spectrometer, wherein said second ion source is provided between said first ion source and said mass spectrometer apart from the axis of a flow of the sample ions discharged from said first ion source and emits ions to the flow of sample ions discharged from said first ion source.

2. The mass analysis apparatus of claim 1, wherein said first and second ion sources are atmospheric pressure ion sources that perform ionization at the atmospheric pressure and ions emitted from said first and second ion sources cross also at the atmospheric pressure.

3. The mass analysis apparatus of claim 1, wherein said first ion source is selected from a group of electro spray (ESI), pneumatically assisted electro spray, nano-spray, sonic spray (SSI), and MALDI ion sources.

4. The mass analysis apparatus of claim 2, wherein said second ion source is an atmospheric pressure chemical ionization ion source.

5. The mass analysis apparatus of claim 4, wherein said second ion source comprises a corona discharge electrode, a shield electrode which is formed to cover said corona discharge electrode and has an opening to emit the generated ions, and a power source to supply a voltage to said corona discharge electrode.

6. The mass analysis apparatus of claim 5, wherein said shield electrode is made of a conductive metal material and said opening is covered with a metal mesh.

7. The mass analysis apparatus of claim 5, wherein said shield electrode is kept at the ground potential.

8. The mass analysis apparatus of claim 1, wherein said second ion source is equipped with an inlet section which introduces a compound for accelerating generation of ions.

9. The mass analysis apparatus of claim 8, wherein said compound is selected from a group of alcohols and non-ionic surfactant.

10. The mass analysis apparatus of claim 1, wherein said second ion source is provided between said first ion source and said mass spectrometer.

11. A mass analysis apparatus comprising a first atmospheric pressure ion source which ionizes a sample and produces sample ions, a shield electrode made of a cylindrical metal mesh, a corona discharge electrode

provided outside said shield electrode, a second atmospheric pressure ion source equipped with a power supply which supplies a voltage to said corona discharge electrode to generate ions having a polarity opposite to that of the sample ions, and a mass spectrometer, wherein the sample ions emitted from said first atmospheric pressure ion source are introduced into said shield electrode along the central axis of said shield electrode and made to react with ions generated by said second atmospheric pressure ion source, and ions passing through said shield electrode are introduced into said mass spectrometer for mass spectroscopy.

12. The mass analysis apparatus of claim 11, wherein said shield electrode is kept at a ground potential.

13. The mass analysis apparatus of claim 11, wherein said corona discharge electrode is a needle electrode and a plurality of corona discharge electrodes are provided outside said shield electrode.

14. The mass analysis apparatus of claim 11, wherein said corona discharge electrodes are disposed around said shield electrode apart therefrom in a ring form.

15. The mass analysis apparatus of claim 14,

wherein said corona discharge electrodes are made of thin metal wires.

16. The mass analysis apparatus of claim 14, wherein said corona discharge electrode is made of a ring-shaped metal plate electrode.

17. The mass analysis apparatus of claim 11, wherein said corona discharge electrode is a cylindrical metal mesh placed around said shield electrode apart therefrom.

18. A mass spectrometer comprising a first atmospheric pressure ion source which ionizes a sample and produces sample ions, a cylindrical metal mesh, a shield electrode made of a plurality of metallic dividing walls on the outer periphery of said metal mesh, a plurality of corona discharge electrode provided in a ring manner between said dividing walls outside said shield electrode, and a second atmospheric pressure ion source equipped with a power supply which supplies a voltage to said corona discharge electrode to generate ions having a polarity opposite to that of the sample ions, and a mass spectrometer, wherein the sample ions emitted from said first atmospheric pressure ion source are introduced into said shield electrode along the central axis of said shield electrode and made to

react with ions generated by said second atmospheric pressure ion source, and ions passing through said shield electrode are introduced into said mass spectrometer for mass spectroscopy.

19. The mass analysis apparatus of claim 18, wherein said corona discharge electrodes are thin metallic wires.

20. The mass analysis apparatus of claim 18, wherein said corona discharge electrode is made of a ring-shaped metal plate electrode.

21. The mass analysis apparatus of claim 18, wherein said power supply is provided for each corona discharge electrode.

22. The mass analysis apparatus of claim 18, wherein said first and second ion sources and said mass spectrometer are disposed so that the axis along which said first atmospheric pressure ion source emits sample ions through said second atmospheric pressure ion source may intersect the axis along which ions are introduced into small aperture of said mass spectrometer.

23. A mass spectrometry by a mass spectrometer comprising a first ion source which ionizes a sample and produces sample ions, a second ion source which generates reactant ions having a polarity opposite to

that of the sample ions and emits the reactant ions to said sample ions, and a mass spectrometer which receives a mixture of said reactant ions and the sample ions and performs a mass spectroscopy thereon, wherein said mass spectrometric method comprises the steps of generating reactant ions by said second ion source intermittently and periodically while said first ion source generates sample ions continuously, mass-scanning said mass spectrometer respectively while said second in source makes ionization and while said second in source does not make ionization, and obtaining mass spectra thereof.

24. A mass spectrometry by a mass spectrometer comprising a first ion source which ionizes a sample and produces sample ions, a second ion source which generates reactant ions having a polarity opposite to that of the sample ions and emits the reactant ions to said sample ions, and a mass spectrometer which receives a mixture of said reactant ions and the sample ions and performs a mass spectroscopy thereon, wherein said mass spectrometric method comprises the steps of generating reactant ions by said second ion source intermittently and periodically while said first ion source generates sample ions continuously, mass-scanning said mass spectrometer several times

respectively while said second in source makes ionization and while said second in source does not make ionization, and obtaining mass spectra thereof.

25. A mass spectrometry by a mass spectrometer comprising a first ion source which ionizes a sample and produces sample ions, a second ion source which comprises a corona discharge electrode and a power supply for applying a voltage to said electrode, generates reactant ions having a polarity opposite to that of the sample ions and emits the reactant ions to said sample ions, and a mass spectrometer which receives a mixture of said reactant ions and the sample ions and performs a mass spectroscopy thereon,

wherein said mass spectrometric method comprises a step of step-by-step varying the voltage which is applied from said power supply of said second ion source to said corona discharge electrode while said first ion source ionizes continuously.

26. A mass spectrometry by a mass spectrometer comprising a first ion source which ionizes a sample and produces sample ions, a second ion source which comprises a plurality of corona discharge electrodes and power supplies for applying a voltage to said electrodes, generates reactant ions having a polarity opposite to that of the sample ions and emits the

reactant ions to said sample ions, and a mass spectrometer which receives a mixture of said reactant ions and the sample ions and performs a mass spectroscopy thereon, wherein said mass spectrometric method comprises a step of shifting voltage applying periods of corona discharge electrodes of said second ion source respectively while said first ion source ionizes continuously.

27. A mass spectrometry by a mass spectrometer comprising a first ion source which ionizes a sample and produces sample ions, a second ion source which comprises corona discharge electrodes and power supplies for applying a voltage to said electrodes, generates reactant ions having a polarity opposite to that of the sample ions and emits the reactant ions to said sample ions, and a mass spectrometer which receives a mixture of said reactant ions and the sample ions and performs a mass spectroscopy thereon, wherein said mass spectrometric method comprises a first step of controlling said power supplies to zero the discharge current to said corona discharge electrode and collecting mass spectra, a second step of totaling all ion intensities in a preset mass range, computing a corona discharge current value or applied voltage from the total ion intensity, setting the

corona discharge current value or applied voltage to said power supply, and collecting mass spectra, and said first and second steps are repeated periodically.